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The Pleistocene Deposits
of
Sankoty Head, Nantucket,
and Their Fossils.

JOSEPH AUGUSTINE CUSHMAN.



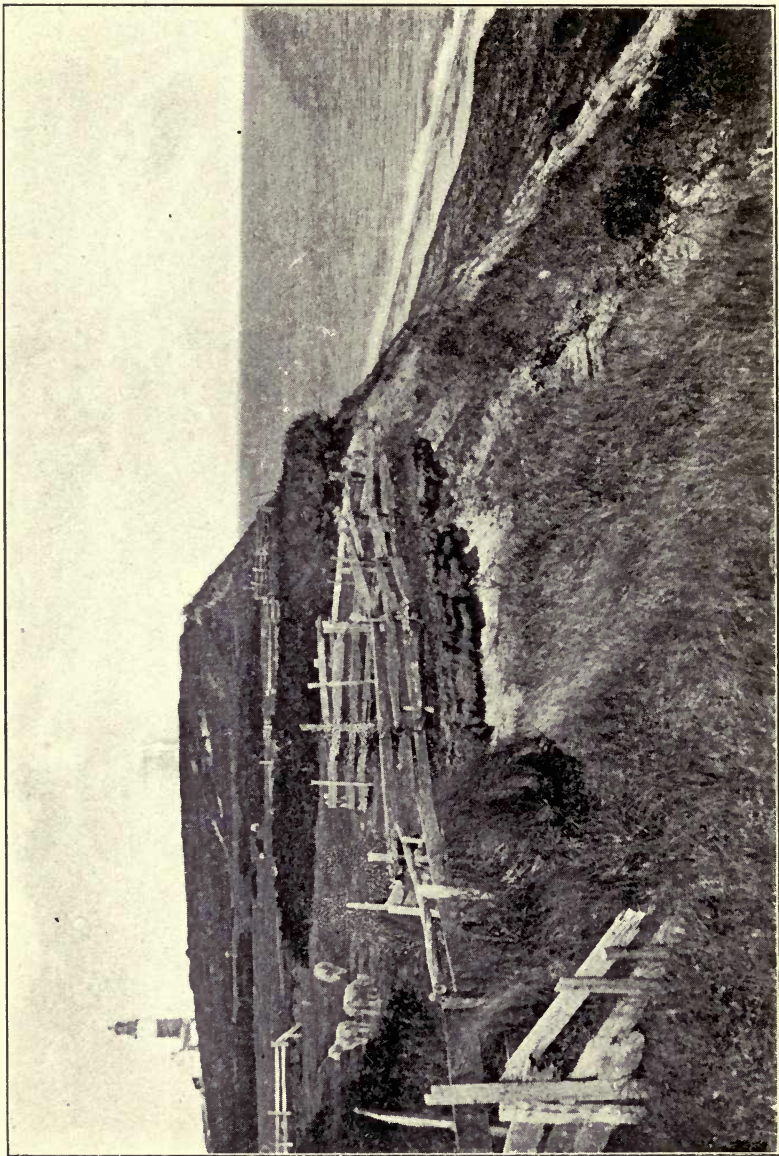
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NANTUCKET, MASS.
FEBRUARY
1906.



CLIFFS AT SANKOTY HEAD CONTAINING THE FOSSILIFEROUS PLEISTOCENE BEDS

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I. HISTORICAL SUMMARY.

The earliest record of the fossiliferous beds at Sankoty Head appears to be that of Desor. In 1848 he visited the eastern portion of the island in company with Lieutenant Davis, U. S. N., and discovered the fossils in the two beds in the cliffs of "Sankoty." A visit was also made to the cliff with Edward C. Cabot, during which a collection of the fossils was made. These fossils were exhibited at a meeting of the Boston Society of Natural History, November 18, 1848, and a paper describing the deposits read at the same time. An abstract of this paper is given in the Proceedings of the Society and an account also in the first Proceedings of the American Association.

In February 1849, there appeared a paper by Messrs. Desor and Cabot in the Quarterly Journal of the Geological Society of London. In this a somewhat lengthy account is given of the exposed

section and the occurrence of the fossils. Their conclusions were based upon an insufficient knowledge of the region and are later referred to by Merrill as "some stratigraphical generalizations which were entirely imaginary." They supposed a Tertiary basin underlying Martha's Vineyard and Nantucket, the deposits at Gay Head marking one side of the basin, those at Sankoty Head marking the other. Among other points a distinction is made between the lower bed in which bivalves were "found in their natural position, both valves together, showing that the animals died in the place in which they lived. . . ." The shells in the two beds are spoken of as being the same, although those of the upper bed were "bleached and more or less worn" therefore "exposed to the action of the waves before they were buried." A list of seventeen species is given with a brief note as to their abundance.

For over twenty-five years the work of Desor and Cabot was not added to or confirmed. In the summer of 1875, however, with the establishment of the U. S. Fish Commission at Woods Hole, activity was again manifested. A party consisting of Prof. Alpheus Hyatt, Mr. Sanderson Smith, Mr. C. H. Merriam and others visited the cliff and collected fossils. It was visited later by Mr. S. H. Scudder of Cambridge who made an extensive excavation to expose the fossiliferous beds. Mr. Richard Rathbun also visited the locality for the Commission and collected largely, keeping distinct the fossils of the upper and lower beds. Mr. Scudder exhibited his collection at the meeting of the Boston Society on October 6, 1875, and gave an account of them and of the cliff. With Prof. A. E. Verrill, he also published a paper in the *American Journal of Science* in November of the same year. Mr. Scudder in this paper gives an account of the section, while Prof. Verrill limits himself mainly to the fossils. In Prof. Verrill's list are given sixty-three species and varieties, with the bed in which each occurs, distinguished for the first time. He also makes certain biological deductions as a result of this study of the two beds, showing that the animals of the lower bed were of a decidedly southern character while the upper bed contains a more northern assemblage. This seems to indicate a change in conditions between the deposition of these two layers.

Until 1889 no further work appeared upon these deposits. At that time Prof. Shaler's paper on the Geology of Nantucket was

published. In this he reviews the work of previous writers and compares their statements with the exact conditions existing there. Much of the work of Desor and Cabot, Scudder, and Verrill is republished. No new fossils are added but a considerable amount is done on the section exposed there.

In 1896 Arthur Hollick published some notes on the cliff and gives a list of the fossils he observed there, adding somewhat to the list. At the same time a short paper by Frederick J. H. Merrill gives a detailed section of the cliff in which are distinguished four fossiliferous layers. Lists are given of the fossils found in the various layers recognized. These add several species to the list given by Prof. Verrill to whose generalizations in regard to the beds and their formation exceptions are taken. The exceptions are in favor of transportation of the original material to its present position.

In September 1904, the writer published a paper giving a list of the fossils known from the deposits and adding a new one. These were arranged in tabular form to show their relations in the four beds and their present range, as either northern or southern forms, indicated. The relations of the fossils of these four beds are considered, the range of the species being taken as a basis.

During the summer of 1904, Mr. J. Howard Wilson spent some time at Sankoty Head and made a considerable excavation there. He collected many fossils a number of which had not previously been known from these deposits. A notice of Mr. Wilson's work appeared in *Science*, in June 1905. In an early paper a complete account of the work is looked for.

Since the formation of the Nantucket Maria Mitchell Association, local interest in these deposits has been awakened. Several of the members of the Association have been enthusiastic in trying to add to the already long list of fossils from the cliff. Chief among these may be mentioned Miss Elizabeth Kite, who relocated the deposits and collected many specimens, and Mrs. Albertson, the Curator, to whose interest the work is mainly due at present. In 1905 a special committee was appointed to as far as possible obtain more specimens from the cliff. On July 4, 1905, a collecting trip was made to Sankoty Head and proved to be very successful. A section was made through the fossiliferous beds and the section photographed. A reproduction of this is given on Plate II. A con-

siderable number of specimens were collected, especially of the smaller mollusks. A number of crab claws were also obtained. Some of the results of the collecting trip were published by the writer in the *American Geologist* for September. A number of species not previously recorded were found, as well as others which are rare.

II. THE EXPOSED CLIFF SECTION.

That the cliff section shown at Sankoty Head has changed since the first mention of it by Desor and Cabot, is very certain. At that time and for many years following, the waves attacked the base of the cliff, gradually eating their way into it and causing a complete exposure of the beds from top to bottom. Since the time of the earliest observers there has come about, what may be considered a radical change. The beach, from the angle of the island near Siasconset, has gradually been extending northward so that for some years the base of the cliff has been protected from the erosive action of the waves. As a result of this protection, a large part of the surface of the cliff has now become clothed with vegetation. This covering is mainly of the coarse grass which so readily obtains a foothold when actual erosion is prevented. This change of the contour of the beaches has for years been given much attention. In this particular case its practical side is seen, for if active erosion should continue the lighthouse might become endangered. This protection makes harder the work of excavation and necessitates removing a large amount of loose material in order to reach portions which are in their original condition.

From comparisons made during the past summer the section at present conforms most nearly to that given by Merrill in 1896, although in the fossiliferous beds a difference in thickness was noted. It is probable that these beds are of varying thickness in their different parts. The following section is given by Merrill at a point about three hundred yards south of the lighthouse, where the last summer's work was done:

PLATE II.



DETAILS OF SECTION THROUGH THE FOSSILIFEROUS BEDS,
(From photo. taken July 4, 1905 by Dr. Richmond.)

1. Fine dark drifted sand	3 feet
2. Yellow sandy drift, ferruginous at the bottom and containing pebbles	5 "
4. Coarse gray stratified sand, with particles of greensand	.40 "
5. Fragment bed [4]	1 "
6. Upper shell bed [3]	8 inches
7. Clayey ferruginous sand	4 "
8. Serpula sand [2]	1 " 3 "
9. Lower shell bed [1]	9 "
10. Red sand, with fragments of blue clay	1 "
11. White sand of varying quality and size	4 "
Concealed by turf and beach sand24 "
<hr/>	
Total	91 feet

In the excavation made the last summer the thickness of the upper two fossiliferous beds seems to be much the same or even of less thickness, while both the intermediate sand and the lower layers seem to be much thicker than given above.

A photograph of the section is given on Plate II. As the light late in the afternoon was not strong enough to bring out the contacts, pieces of fossil shell were inserted for guides. At the top of the plate is shown the fine white sand, No. 4 of the section. The ferruginous streaks and the bedding are easily made out. Below this between the two upper pieces of shell is the fragment bed, of lighter color than the one below, due to the mass of shell fragments. Below this and extending to the floor of the first shelf of the excavation is the upper shell bed, No. 6 of the section. The floor of this upper shelf is formed by layer No. 7, a clayey ferruginous sand. The bed can be distinguished in the photograph, especially on the right. It extends downward to a point slightly below the shell fragment in its face. Below this is the Serpula bed, made up of tubes, frequently covered by Bryozoa, and also a few shells. This is the thickest of the fossiliferous beds. Its contact with the lower shell bed may be made out at the right of the excavation, slightly below the handle of the shovel. From this point to nearly the top of the blade of the shovel extends the lower shell bed, the shells in place easily made out in the photograph. From this to the lower shelf on which the shovel rests is layer No. 10: a reddish sand with pieces of sticky blue clay. This also makes up the floor of the shelf and its contact with the white sand bed below it may be made out in the vertical face nearest the observer.

The exposed section, shown on Plate II, corresponds as will be seen, in all essential characters to that given above by Merrill. Another visit to the locality was planned for September 4th, but the hard storm at that time made the trip impossible.

III. THE OCCURRENCE OF THE FOSSILS.

One of the first things that strikes one as he begins to dig these fossils is their fragile condition. Like so many similar deposits, the shells are soft and moist when first dug out and must be handled with extreme care. Upon drying and exposure to the air they become much harder and firmer. In their natural condition they are much darker, as a rule, than they are after exposure to the air and light.

Many of the shells, especially in the upper bed, are represented only by fragments, great masses of which appear. On the other hand, especially in the lower shell bed, many excellently preserved shells are found. Among these are many of the Gastropods with the apical whorls and the protoconch in excellent condition. Many of the shells of *Venus mercenaria* had the purple inner border of the shell preserved to a surprising degree.

In the lower bed many of the bivalves were found with both valves together and the shell in the position of life. This was noted especially in *Arca*, *Venus*, *Ostrea* and *Mytilus*.

A considerable number of attached forms are noted, such as the various species of Bryozoa on shells and on the tubes of *Hydroides dianthus*. Shells of *Ostrea*, *Venus* and *Arca* show the borings of *Cliona sulphurea*.

Among other groups than the Mollusca the evidence is usually fragmentary. Spines of sea urchins are not uncommon and a considerable number of crab claws were obtained. These are most easily seen after the excavated material has been exposed to the weather for a time.

Many of the shells show beautiful dendritic markings. The clam shells seem to have this more prominently shown than the others. A number of the others, however, show the markings to a lesser degree.

IV. SYSTEMATIC LIST OF THE FOSSILS.

In the following list are included all the records for these deposits*. The names used vary somewhat from those under which the species were originally reported and for sake of clearness, many of the older names are given in parentheses after the name accepted in present usage. Also, after the name, is given the reference to the paper in which the first record of the particular species from this locality was published. Where specimens of the species are in the collection of the Nantucket Maria Mitchell Association, an asterisk is placed before the particular species. For brevity in referring to the fossiliferous beds, they are numbered 1-4, beginning at the bottom. This is indicated by the figures in brackets in the table showing the complete section as given by Merrill. To Mr. Chas. W. Johnson I am greatly indebted for help with the nomenclature of the Mollusca.

PROTOZOA.

*MILIOLINA SUBROTUNDA Montagu.

A single specimen of this species was found by the writer in sand from the lower bed, No. I.

PORIFERA.

*CLIONA SULPHUREA (Desor). (Verrill, 1875, p. 373).

Many of the larger bivalves of the lower bed, especially *Ostrea* and *Venus* are bored by this sponge.

ECHINODERMATA.

*STRONGYLOCENTROTUS DRÖBACHIENSIS (Müll.) (Verrill, 1875, p. 375).

Spines of this sea urchin are not uncommon in bed No. 3. In material which has been exposed to the air the spines are easily seen.

ANNELIDA.

*HYDROIDES DIANTHUS (Verr.) (*Serpula dianthus*, Verrill, 1875, p. 373).

Serpula is mentioned by Desor and Cabot. It makes up a large part of bed No. 2, but is also common in the lowest bed on oyster shells, etc.

*FOOTNOTE. The recent paper of Mr. J. H. Wilson has added to the list given here.

BRYOZOA.

*HIPPOTHOA VARIABILIS (Leidy). (Verrill, 1875, p. 372).

Found in beds 1 and 2 encrusting Hydroides tubes.

*MEMBRANIPORA TENUIS Desor. (Verrill, 1875, p. 372).

Found on shells of the lower bed, No. 1.

MEMBRANIPORA CATENULARIA Smitt. (Verrill, 1875, p. 372).

Found on shells of the lower bed, No. 1.

ESCHARA VERRUCOSA Esper. (Verrill, 1875, p. 374).

On shells of Ceronia from bed No. 3.

CELLEPORARIA INCRASSATA Smitt? (Verrill, 1875, p. 374).

Reported by Verrill from the upper bed, No. 3.

MOLLUSCA—PELECYPODA.

*ARCA TRANSVERSA Say. (Desor and Cabot, 1849, p. 342).

This is one of the most abundant of the shells of the lower bed, No. 1, but is also found sparingly in beds 2 and 3.

*ARCA LIMULA Conrad. (*Arca ponderosa*, Cushman, 1904, pp. 170, 172, 1905, p. 195).

This is not, as was first supposed, *Arca ponderosa* Say, but is *Arca limula* Conrad, a southern fossil shell. The species is apparently limited to the lower bed. During the summer a complete specimen was found with both valves together and the shells upright in the position of life.

ARCA PEXATA Say. (Merrill, 1896, p. 13).

Reported from a layer between Nos. 2 and 3. No specimens have been seen by the writer and the record is left upon Merrill's authority.

*OSTREA VIRGINICA Gmel. (*Ostrea borealis*, Desor and Cabot, 1849, p. 342).

Apparently the most abundant shell of the lower bed. The two valves are frequently found together, and show much variation. It is frequently bored by *Cliona sulphurea*. This species occurs with the preceding in the intermediate bed mentioned by Merrill, and also occasionally in bed No. 3.

ANOMIA ACULEATA Gmel. (Verrill, 1875, p. 374).

Found in the upper shell bed No. 3.

*ANOMIA SIMPLEX d'Orb. (*Anomia glabra*, Verrill, 1875, p. 372),
Fairly common in the lower shell bed, No. 1.

*MYTILUS EDULIS Linn. (Verrill, 1875, p. 372).

Found in both the lower and upper beds, Nos. 1 and 3, but it is much more abundant in the latter.

*MYTILUS HAMATUS Say = M. RECURVUS Raf. (*Modiola hamatus*, Verrill, 1875, p. 372). *Plate III figure 2.*

This is fairly common in the lower shell bed, No. 1, and is also found in bed No. 2. During the last summer a complete specimen with both valves together was found in the lower bed.

*MODIOLUS MODIOLUS Linn. (Verrill, 1875, p. 374).

Found in the upper beds. Nos. 3 and 4.

*CRENELLA GLANDULA Totten. (Verrill, 1875, p. 372).

Found in beds 1, 3, and 4. Those in the upper beds seem to be larger and more common than in the lower one. This is the first record of this species in bed No. 4.

THRACIA TRUNCATA Mighels and Adams. (Verrill, 1875, p. 372).

A few specimens referred to bed No. 3 by Verrill.

PANDORA (CLIDIOPHORA) GOULDIANA Dall. (*Clidiophora trilinata*, Verrill, 1875, p. 374).

The record for this species is based upon a single valve from the upper shell bed, No. 3, recorded by Verrill.

PANDORA CRASSIDENS Conrad. (Wilson, 1905, p. 989).

Wilson's record for this species is the first from a formation above the Miocene. The species is very close to the preceding one.

*ASTARTE CASTANEA Say. (Desor and Cabot, 1849, p. 342).

Abundant in the upper shell bed, No. 3. Also found by Merrill in bed No. 2.

*ASTARTE QUADRANS Gould. (Hollick, 1896, p. 9).

This species occurs sparingly in beds 2 and 4.

ASTARTE UNDATA Gould. (Verrill, 1875, p. 376).

A single worn valve of this species from bed No. 3 was found by Verrill in the material he examined.

CRASSINELLA MACTRACEA Linsley. (Verrill, 1875, p. 372).

From the lower shell bed No. 1. Verrill records one specimen of this small species.

*VENERICARDIA (CYCLOCARDIA) BOREALIS Conrad. (*Cardita borealis*, Desor and Cabot, 1849, p. 342).

Specimens of this shell are very common in the upper shell bed No. 3.

*VENERICARDIA (CYCLOCARDIA) NOVANGLIAE Morse. (*Cyclocardia novangliae*, Verrill, 1875, p. 374).

Found sparingly in the upper two beds, Nos. 3 and 4.

SERRIPES LAPEROUSII Desh. (Wilson, 1905, p. 989).

Found by Wilson. The first record for the species east of Point Barrow.

*VENUS MERCENARIA Linn. (Desor and Cabot, 1849, p. 342).
Plate III, figure 1.

Shells of this species are very abundant in the lower shell bed No. 1, and a few are found in beds 2 and 3. Some of the shells have the characteristic purple of the interior very well preserved. Many of the shells are bored by *Cliona sulphurea*. To the heavy thick forms of this species from the lower shell bed, Verrill has given the varietal name, *antiqua*.

GEMMA GEMMA Totten. (*Tottenia gemma*, Verrill, 1875, p. 372).

A few shells of this species were found by Verrill in material from the lower shell bed.

*PETRICOLA PHOLADIFORMIS Linn. (Verrill, 1875, p. 371).

Found occasionally in the lower shell bed.

TELLINA (ANGULUS) TENERA Say. (*Angulus tener* Verrill, 1875, p. 371).

Several specimens of this species were found by Verrill in material taken from the lower shell bed, No. 1.

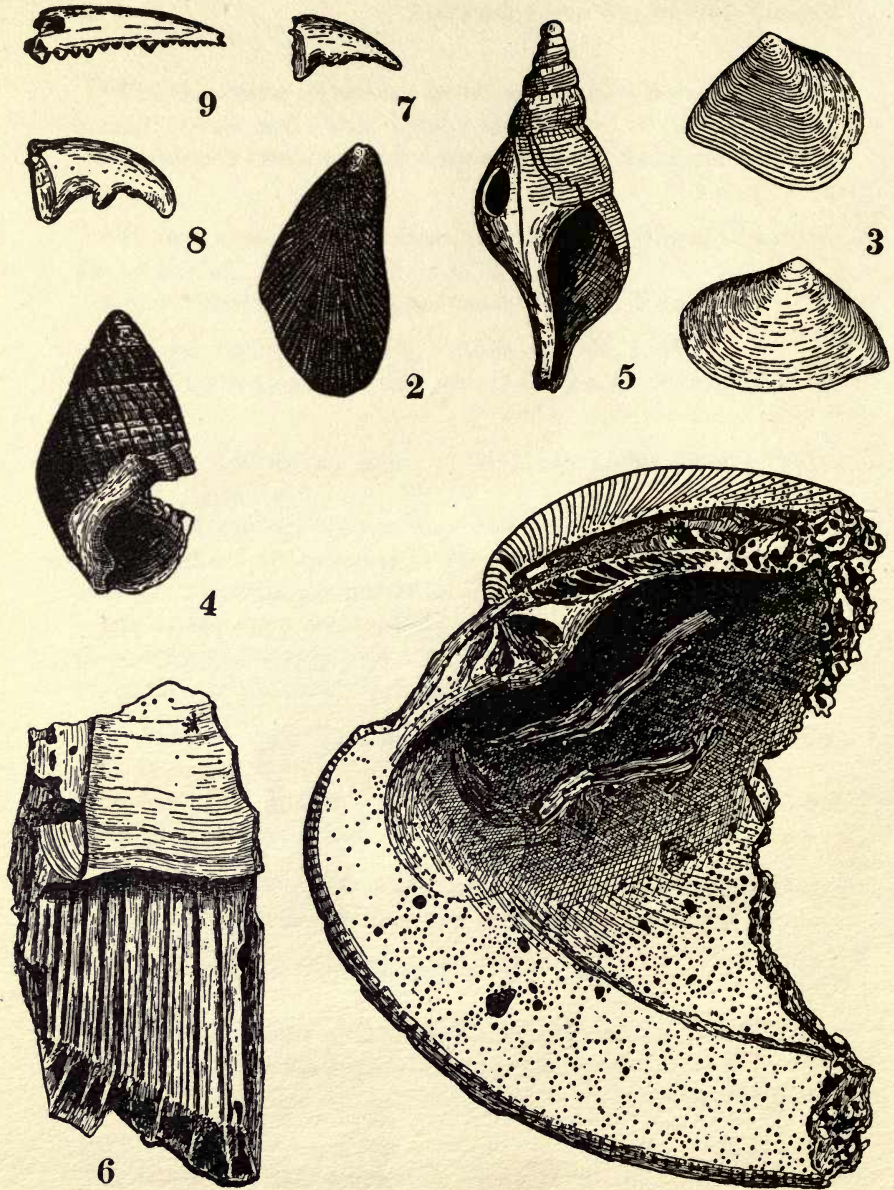
MACOMA BALTHICA Linn. (*Macoma fragilis*, var. *fusca*, Verrill, 1875, p. 374).

Specimens of this species are occasionally found in the upper shell bed, No. 4.

MACOMA INCONGRUA V. Martens. (Wilson, 1905, p. 989).

Found by Wilson. The first record for the species east of Point Barrow. It is very close to the preceding species.

PLATE III.



J.A. Cushman, del.

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FIG. 1. *Venus mercenaria* Linn., bored by *Cliona sulphurea* Desor, and with tubes of *Hydroides dianthus* Verr. attached. 2. *Mytilus hamatus* Say. 3. *Cumingia tellinoides* Conrad. 4. *Nassa obsoleta* Say. 5. *Sipho stimpsoni* Mörch., var. *brevis* Verr. 6. *Balanus porcatus* DaCosta. 7. *Neopanope texana sayi* Smith. 8. *Eupanopeus herbstii* Milne Edwards. 9. *Callinectes sapidus* Rathbun.

*CUMINGIA TELLINOIDES Conrad. (Desor and Cabot, 1849, p. 342). *Plate III. figure 3.*

Very common in the lower shell bed, No. 1, and also found in the Serpula bed, No. 2.

*ENSIS DIRECTUS Conrad. (*Solen ensis*, Desor and Cabot, 1849, p. 342).

Fragments of this species are abundant in the lower shell bed, but complete specimens are rare. It also occurs less commonly in beds 2 and 3.

*SPISULA SOLIDISSIMA Dillw. (*Mactra solidissima*, Verrill, 1875, p. 374).

Found frequently in the upper shell bed, No. 3 and occasionally in bed 4.

*MESODESMA ARCTATA Conrad. (*Ceronia arctata*, Verrill, 1875, p. 374).

Common in the upper shell bed No. 3, and found this last summer in material from bed No. 4.

MESODESMA DEAURATA Turton. (*Mesodesma Jauresi*, Hollick, 1896, p. 9).

This is reported by Hollick but the exact bed is not given. It is referred to the upper shell bed No. 3, until other findings give its exact position.

*MYA ARENARIA Linn. (Desor and Cabot, 1849, p. 342).

Shells of this species are abundant in the lower shell bed, No. 1, and some few are found in bed No. 3. Many of the shells have beautiful dendritic markings.

MYA TRUNCATA Linn. (Verrill, 1875, p. 373).

Verrill reports several large shells of this species from the upper shell bed, No. 3.

CORBULA CONTRACTA Say. (Verrill, 1875, p. 371).

A single valve of this species was found by Verrill in material taken from the lower shell bed, No. 1.

*SAXICAVA ARCTICA Linn. (Verrill, 1875, p. 371).

Found in beds 1 and 3. The specimens from the upper shell bed are much more numerous and larger than those of the lower bed.

PANOMYA NORVEGICA Spengl. (*Saxicava norvegica*, Verrill, 1875, p. 373).

A single valve of this species is recorded by Verrill from the upper shell bed. It is very probable that the fragments recorded by Hollick as *Panopaea* sp? may be referable to this species.

MOLLUSCA—GASTROPODA.

PUNCTURELLA NOACHINA Linn. (*Diodora noachina*, Verrill, 1875, p. 373).

Verrill records "two good specimens" of this from the upper shell bed, No. 3.

SOLARIELLA OBSCURA Couth. (*Margarita obscura*, Merrill, 1896, p. 13).

Fragments of this shell were found by Merrill in bed 4.

SKENEA PLANORBIS F. and H. (Merrill, 1896, p. 13).

This species was found by Merrill in bed 4.

*ODOSTOMIA IMPRESSA Say. (Verrill, 1875, p. 371).

This small shell is common in the lower shell bed, No. 1.

*ODOSTOMIA SEMINUDA C. B. Adams. (Cushman, 1905, p. 195).

Specimens of this species were found during the last summer in loose material evidently from bed No. 1.

*ODOSTOMIA TRIFIDA Gould. (Verrill, 1875, p. 370).

Fairly common in the lower shell bed, but apparently less common than *O. impressa* Say. It is also found in bed No. 1.

*ODOSTOMIA BISUTURALIS Say. (Cushman, 1905, p. 195).

Found during the last summer with *O. seminuda* C. B. Adams.

*ODOSTOMIA FUSCA C. B. Adams. (Cushman, 1905, p. 195).

A single specimen, apparently referable to this species was found in the loose material.

TURBONILLA INTERRUPTA Totten. (Verrill, 1875, p. 371).

Found sparingly in beds 1 and 2.

SCALA GROENLANDICA Perry. (Desor and Cabot, 1849, p. 342).

Very rare, apparently found in bed No. 3, as it is a northern species.

*SCALA FRAGILIS Gray? (*Scala* — —, Cushman, 1905, p. 195).

A single specimen of this species was found by the writer in the loose material this last summer. For a clue as to the relations of this puzzling specimen I am indebted to Dr. W. H. Dall.

*CREPIDULA CONVEXA Say. (Verrill, 1875, p. 370).

Found in both beds, 1 and 2, but it is not common.

*CREPIDULA FORNICATA Lam'k. (Desor and Cabot, 1849, p. 342).

This species is abundant in the lower shell bed No. 1 and is also found, in much less numbers, in beds 2 and 3. In some cases the original color of the shell is very well preserved.

*CREPIDULA PLANA Say. (Verrill, 1875, p. 370).

Common in bed No. 1, also found in bed No. 3, but in fewer numbers.

*CRUCIBULUM STRIATUM Say. (Verrill, 1875, p. 373).

Verrill reports one large specimen of this species from the upper shell bed No. 3. Merrill also reports it from this bed. There are specimens of this species in the collection at Nantucket.

*LUNATIA HEROS Say. (Verrill, 1875, p. 373).

Found in both of the upper beds, 3 and 4. The specimens have usually lost their organic matter and the shells are very fragile.

*Var. TRISERIATA Say. (Verrill, 1875, p. 373).

Verrill records a single specimen of this banded form from the upper bed, but it is fairly common there.

NEVERITA DUPLICATA Say. (Verrill, 1875, p. 373).

A single broken specimen is recorded by Verrill from the upper shell bed.

CINGULA (ONOA) ACULEUS Gould. (*Rissoa aculea*, Merrill, 1896, p. 13).

Merrill records this species from bed No. 4.

CAECUM PULCHELLUM Stimpson. (Merrill, 1896, p. 14).

Recorded by Merrill from bed 4.

*CERITHIOPSIS GREENII C. B. Adams. (Verrill, 1875, p. 370).

Verrill records four specimens of this species from the lower bed. There is no other record from these deposits until that of the single very perfect specimen found in the loose materials this last summer by the writer.

ASTYRIS LUNATA Say. (Verrill, 1875, p. 370).

The single specimen recorded by Verrill stands as the only record for these deposits. It was from the lower shell bed.

BUCCINUM UNDATUM Linn. (Desor and Cabot, 1849, p. 342).

This species is found in both beds 3 and 4. It is a fairly common species in the former bed.

*NASSA TRIVITTATA Say. (Desor and Cabot, 1849, p. 342).

Found in both the upper and lower shell beds, Nos. 1 and 3, but much more commonly in the upper.

*NASSA (ILYANASSA) OBSOLETA Say. (Desor and Cabot, 1849, p. 342). *Plate III figure 4.*

This species is found in all the four fossiliferous beds of the deposit, but it is much more common in the lower shell bed than in any of the others.

*UROSALPINX CINEREA Say. (Verrill, 1875, p. 370).

Specimens of this species have been found in beds 1, 2 and 3, but are much more common in the lowest bed than in the others.

*EUPLEURA CAUDATA Say. Verrill, 1875, p. 370).

Verrill records a single specimen of this species from the lower shell bed. The collection from Nantucket, however, contains this species.

*SIPHO STIMPSONI Mörch., var., BREVIS Verrill. (*Neptunea curta*, Verrill, 1875, p. 373. *Chrysodomus curta*, Cushman, 1904, p. 171. *Sipho stimpsoni*, Cushman, 1905, p. 195). *Plate III figure 5.*

This shell is the variety *brevis* of Verrill. He records it from the upper shell bed. There is in the collection at Nantucket, a very perfect specimen of this species with the protoconch excellently preserved.

*NEPTUNEA DECEMCOSTATUS Say. (*Chrysodomus decemcostatus*, Cushman, 1905, p. 195).

There is in the collection at Nantucket a fairly large specimen of this species, but somewhat broken.

TROPHON CLATHRATUS Linn. (*Fusus scalariformis*, Merrill, 1896, p. 12. *Trophon scalariformis*, Cushman, 1904, p. 171).

Merrill records this species from the Serpula bed, No. 2.

CRUSTACEA.

*BALANUS CRENATUS Brüg. (Verrill, 1875, p. 373).

Common in the lower shell bed No. 1, usually with the parts of the shell separated.

*BALANUS PORCATUS DaCosta. (Verrill, 1875, p. 374). *Plate III, figure 6.*

Found in beds 1, 3 and 4. The specimens from the upper shell bed No. 3, are exceptionally large. So far as seen the parts are always separated.

*BALANUS EBURNEUS Gould. (Verrill, 1875, p. 373).

Entire specimens of this species are common attached to *Ostrea* and other shells.

*BALANUS IMPROVISUS Darwin.

Certain of the smaller barnacles seem to belong to this species. The opercular valves are like those figured and described by Darwin for this species. They were from the lower shell bed No. 1.

*NEOPANOPE TEXANA SAYI Smith. (Cushman, 1905, p. 195). *Plate III, figure 7.*

The claws of this species are fairly common. They probably belong to bed No. 1.

*EUPANOPEUS HERBSTII Milne Edwards. (Cushman, 1905, p. 195). *Plate III, figure 8.*

A single claw of this crab was found, associated with the preceding.

*CALLINECTES SAPIDUS Rathbun. (Wilson, 1905, p. 990). *Plate III figure 9.*

A single claw of this species was found with the others.

PAGURUS POLLICARIS Say. (Desor and Cabot, 1849, p. 342).

The original record of Desor and Cabot is the only one for the species. Their specimens may have belonged to one of the above species may have been wrongly identified.

V. LITERATURE RELATING TO THE SANKOTY HEAD DEPOSITS.

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